



Street Lighting Guidelines

Asset Management and Systems

1. Guideline Definitions

AC – Auckland Council

AT - Auckland Transport

ATCOP - Auckland Transport Code of Practice

AMP – Asset Management Plan

CCO – Council Controlled Organisation

HPS - High pressure sodium lamps are commonly used for street lights and produce a characteristic yellow or orange illumination. Although the lamps have a long operating life, the human eye is less sensitive to yellow light than it is to white light and the yellow light can distort colours or change the appearance of objects.

Illumination refers to the amount of light falling on a given surface. For street lighting, illumination is measured on the ground and is measured in units called “lux”.

A **lamp** is a light source, often referred to as the light bulb.

A **luminaire** is the light fitting that houses the lamp and reflector.

A **LED** is a solid-state lamp that uses light-emitting diodes (LEDs) as the source of light. Since the light output of individual light-emitting diodes is small compared to other lamp types, multiple diodes are used together in arrays. LED lamps offer long service life and high energy efficiency, but initial costs are higher than those of conventional street lights.

Lux is the measure of the amount of light that reaches a given area on a flat surface. $1 \text{ lux} = 1 \text{ lumen/m}^2$

Metal halide lamps are an energy efficient source of white and blue-white light. They are more compact than high pressure sodium lamps and have a colour rendering index of 85 – they perform better optically, are more energy efficient but have a shorter operating life than the HPS lamps.

Legal road has the same meaning as **road** in the Local Government Act 1974 (Section 315). In short, it covers the total area of land between road boundaries including:

- carriageway (formed road)
- footpath including kerb and channelling
- cycle ways, cycle paths
- land that is legally designated as road but is not currently formed as carriageway or footpath

MFP – Multi-function poles

Night glow refers to the unnaturally bright night sky that occurs over large cities. It obscures the stars and planets and may also disturb birds and other wildlife.

Spill refers to light that misses its target. It represents waste light and energy and contributes to night glow. Light spill may also be referred to as “stray light” and may be a nuisance to observers.

Rural generally refers to countryside or small village style built environments with relatively low population densities and a predominance of undeveloped green space.

SOI – Statement of Intent

Terminology is used in this document to describe whether an aspect or statement is a requirement under law/mandatory or good practice:

- **Must** – indicates something that is mandatory or required by law
- **Should** – indicates a recommendation
- **May** – indicates something that is optional and may be considered for use.

Urban generally refers to areas with a built environment and dense population, such as cities and towns.

2. Guideline Statement

The Mayor's vision outlines turning Auckland into the world's most liveable city by 2040. The Auckland Plan has identified that an efficient and integrated network of roads and public transport is vital to delivering this vision. As a Council Controlled Organisation (CCO), AT is responsible for delivering the region's transport services – from roads and footpaths to cycling, parking and public transport. Through the Statement of Intent (SOI) and to contribute to the achievement of priority areas and targets contained in the Auckland Plan, AT is required to prioritise and optimise investment across transport modes and related infrastructure.

AT has developed a set of guidelines to ensure that the transport services will be delivered on a consistent basis around the Auckland region. These guidelines identify the approach that AT will apply when managing the transport assets. The approach identified in the guidelines is cognizant with the Level of Service identified in the Integrated Transport Programme and Asset Management Plan (AMP).

The AT Street Lighting Guidelines provide guidance on the provision of lighting along legal public roads and outlines AT's approach to achieving appropriate illumination levels.

AT provides street lighting which:

- helps improve visibility after dark,
- enables safe, secure and convenient movement of vehicles, pedestrians and cyclists,
- reduces the likelihood of criminal activity at night through appropriate design
- offers special amenity areas (such as the CBD) a distinct after-dark identity and atmosphere.

AT is keen to consider the installation of energy efficient lighting equipment and supports the use of alternative energy sources (such as solar powered lighting) where appropriate.

3. Background

AT is responsible for the provision of street lighting for the Auckland region. It is estimated that there is more than 7,000 km of legal road (including rural, urban, sealed and unsealed) around the region, including the Gulf Islands, much of which requires lighting at night for better visibility, safety and security purposes.

These guidelines outline the basic principles and standards that apply to street lighting in the Auckland region. The term "street lighting" encompasses all items of illuminated street furniture provided on the public roads, except traffic signals and electrically operated information signs. Traffic signals and signage falling under the responsibility of the New Zealand Transport Authority (NZTA) are outside the scope of these guidelines.

4. Purpose and Scope

The purpose of the lighting guidelines is to achieve a consistent and coherent approach to the provision of lighting on public roads across the Auckland region. These guidelines also seek to ensure lighting is provided to the correct level and facilities such as cycleway, subways and pedestrian areas are lit to a safe and consistent basis. The performance standards and detailed specifications for the provision of lighting in the road corridor are provided in the AT Code of Practice (ATCOP) Street Lighting chapter.

These guidelines include lighting on or in:

- Roads (focus is on all urban roads and rural arterial intersections)
- Pedestrian crossings
- Steps and subways
- Stairs and ramps
- Footbridges
- Cycle paths

- Pedestrian walkways
- Public shopping precincts
- Publically owned carpark (both indoor and outdoor)
- Signs – speed signs, way finding signs
- Exterior lighting on buildings only where such lighting replaces street lighting on columns

Also included in these guidelines are areas in the region that are deliberately not lit, such as the Waitakere Ranges, public roads on the Hauraki Gulf Islands and some rural roads.

These guidelines specifically exclude:

- Parks and reserves
- Exterior lighting on buildings (unless it replaces street lighting)
- Traffic signals and signage are outside the scope of the guidelines.

The following guidelines apply to the provision and maintenance of street lighting:

- The promotion of safety for all users of the road corridor with special consideration for all vulnerable user groups, e.g. pedestrians, cyclists, the elderly or people with disabilities and children, the principal aim of which is to reduce night-time accidents.
- The enhancement of the night-time environment with special reference to lighting in historic or special amenity areas.
- The promotion of crime prevention issues together with increasing personal security, reducing the fear of night-time attacks on individuals and to deter vandalism of property.
- The avoidance of detrimental environmental impact in terms of the visual appearance of lighting, both day and night, adjacent to and on the road and the overall impact on the environment in terms of energy conservation and light pollution.
- The provision of cost-effective lighting systems which are energy efficient, incorporate whole-life costs, and recycling initiatives whilst promoting the purchase of energy derived from renewable resources.

5. Guidelines

5.1 General Requirements

5.1.1 Standard of Lighting

The lighting performance and design requirements for new street lighting infrastructure works must comply with the lighting standards described in AS/NZS 1158 (and subsequent revisions), as detailed in the ATCOP Street Lighting chapter (from herein this standard is referred to as The Standard). The lighting requirements should be designed to take into account an area's unique character and needs in terms of vehicular/pedestrian activity and location of local amenities. A holistic approach to lighting design must be taken so that all factors are considered.

Lighting within the Waitakere Ranges Heritage Area Act (2008) area must be in accordance with The Standard, the provisions within the Act and the Regional Parks Heritage Lighting requirements.

Street lighting on the Hauraki Gulf Islands is addressed in the AT Guideline on the Hauraki Gulf Islands. Generally no street lights are provided on Great Barrier Island or Rakino Island where a mains power connection is unavailable.

5.1.2 Lamps/Luminaires

New or replacement lamps must be either a golden yellow (HPS) or white light source, depending on adjacent lamps.

The newer and more energy efficient lamp technology is preferred over the older type high pressure sodium (HPS) lamps. The performance standards for the lamps are detailed in the ATCOP Street Lighting chapter.

In order to improve the maintenance costs and efficiency, the number of different luminaires must be limited to those identified as meeting the performance standards required in the ATCOP Street Lighting chapter. Special luminaires may be considered on a case by case basis for special amenity areas, however, AT's preference will be for the standard approved luminaires wherever possible.

5.1.3 Columns

AT is seeking to reduce the number of different column designs used across the region with a view to improving the maintenance and renewal efficiency.

The strength of all new columns must meet the minimum requirement as detailed in the ATCOP to support the combined load of the street light and appropriate signage or banners, to assist with reducing the number of columns in the road reserve. Specially designed columns called multi-function poles (MFP) are designed to support lights, banners, traffic signals, bus and interactive signs. These columns have the flexibility to attach a number of services in any position. New columns may be considered for use by AT in accordance with the process described in the ATCOP Street Lighting chapter.

All new columns installed in the road reserve must comply with the design performance standards detailed in the ATCOP Street Lighting chapter.

In special amenity areas or town centres, a decorative cover may be fitted over the column to incorporate heritage or characteristics significant to that area, as described in the Street Amenities Guidelines.

Utility attachments to columns require prior approval and AT may consider such approvals on a case by case basis, and a charge may apply.

5.1.4 Switching and Dimming

All street light columns must have a continuous electricity supply at each column provided by the electricity network company. Each luminaire must be switched at the luminaire using one of the following controls:

- Photocell which turns on at dusk and off at dawn,
- Programmable photocell which will turn on at dusk and off at dawn and dim the light to a pre-set profile during night hours, or
- A transceiver photocell which allows two-way communication back to a central control terminal.

The ATCOP Street Lighting chapter specifies the appropriate technical requirements.

5.1.5 Location of Columns

Where practicable, consideration should be given to reducing street clutter when locating light columns and signs. Positioning of the columns must take into account the location of trees, pedestrian refuges, provision for pedestrian use of the footpath (where applicable), zebra crossings, intersections (both signalised and non-signalised), vehicular access, overhead lines, sight lines and proximity to the carriageway. It should also take into account road safety and potential loss of control crashes.

The final location of each column must be determined by the project engineer in accordance with the ATCOP Street Lighting chapter, and adjacent landowners should be informed. The lighting design for new columns must be submitted to the Design Review Committee for approval prior to construction.

5.1.6 Replacement

Single street lights

Like for like replacement should be considered in the short-term in instances where a single luminaire in a street has failed or reached its design life.

Infill lighting

Infill lighting using new high efficiency lamps and control gear should be used where the existing light levels do not meet the appropriate category of the AS/NZS 1158 standard. In this instance, the luminaire should match the

existing luminaires in the street providing the same colour light output. Electronic ballasts must be used to achieve the targeted overall energy savings identified in Section 5.1.7 below.

Upgrades

Street lighting must be upgraded using the current approved luminaires and/or columns on a street by street basis. Streets should be selected for upgrading on the basis of the asset condition or safety requirements.

5.1.7 Energy Efficiency

Electricity consumption is a major operational cost of the street lighting network and AT is committed to improving energy efficiency to reduce power supply costs. This will be achieved through the introduction of new energy efficient lamps and control gear, where possible, to all new or upgraded lighting projects. Reducing light output at times of low traffic volumes through the use of pre-programmed photocells and photocell transceivers will allow profiles to be changed to match weather and traffic conditions.

AT's overall objective is to maintain the 2011/12 levels of energy consumption into the future, after the connection of additional luminaires to the network. This will mean smarter control of the existing network to reduce lighting levels in off peak times and/or more efficient luminaires.

AT recognises the importance of using renewable energy from solar, wind, etc. which could lead to improved energy efficiency and reduced CO₂ emissions.

When designing lighting for rural roads the use of solar powered lamps should be considered especially where public electricity supply is difficult or expensive to establish.

5.1.8 Labels on Columns

Each column must have a unique identification number with month and year of manufacture printed on a label together with a QR code. The label will be attached to the column during the manufacturing process. Existing columns should be retrofitted with appropriate unique numbers by way of approved labels. The labels must be able to be scanned to access the data base of asset information.

5.1.9 Electricity Supply to Columns

Each street lighting column (or luminaire on the overhead network) must be connected directly to the electricity network providing continuous electricity supply to the luminaire.

5.1.10 Approved Contractors

Only contractors approved by AT to work on the street lighting network should maintain, install or in any other way modify the street light network.

All underground cables in public roads belong to The Electricity Network Company. The Electricity Network Company will install and own all underground cables up to the connection point in each street lighting column.

5.2 Street Lighting - Urban

All street lighting must meet the required standards as set out in The Standard and any additional requirements detailed in the Street Lighting chapter of ATCOP.

5.2.1 Accessway/Cycleway or Public Activity

Lighting of all pedestrian areas must be in accordance with The Standard as described in the ATCOP Street Lighting chapter. Such areas include footbridges, stairs, public shopping precincts, ramps and subways.

All areas with cycle or pedestrian traffic must be lit appropriately for the activity and in such a way as to provide no more illumination than is necessary for security and safety. Movement sensors are recommended to dim the lights at times of low pedestrian movement.

Bicycle or pedestrian path lighting is to be located so as to minimise light spill onto neighbouring property. The choice of sharp cut off luminaires is important.

5.2.2 Exterior Lighting on Buildings

The placement of wall mounted street lighting on buildings should be avoided. However, in narrow streets or footways subject to pedestrian traffic, wall mounted street lighting may be considered on a case by case basis. Approval is required from the AT Subject Matter Expert for Lighting before the design is started. The siting of such lights should take into account:-

- The design on the wall brackets and fixings (should be sympathetic to surroundings and character of street/building),
- The quality, stability and elevation of the building,
- The strength of the wall bracket must be sufficient to carry the horizontal and vertical loads of the installation,
- The ease of maintenance, and
- The free passage of fire appliances.
- An easement is required from the property owner before the installation of wall mounted lights or catenary cables.

Catenary cables are not to be used without the approval of the AT Subject Matter Expert for Lighting.

5.2.3 Special Purpose Lighting for Events

At times a higher level of lighting than specified in the appropriate category of The Standard is required for a special purpose or event. These instances may be considered on a case by case basis and must be approved by AT prior to commencing design/installation.

5.2.4 Trees and Street Lights

All street lights must be located in accordance with the ATCOP, taking into account the location of mature vegetation and trees.

When planting new trees or replacing existing trees, the selection of tree species and location must be determined in accordance with the AT Vegetation in the Road Reserve guidelines to ensure vegetation does not impede the function of street lights or other items of illuminated street furniture (such as signs). For mature tree-lined roads, if single sided or narrow, lighting columns should be located on the road side opposite the trees. For roads with mature trees on both sides, careful placement of the columns and pruning of the canopy may be necessary to allow light to pass under the tree canopy.

When developing a design for street lighting along a tree lined corridor, the design engineer must also provide a landscape plan with the lighting design, for approval by the Auckland Council arboriculture advisor (where applicable). The design must also be submitted to the Design Review Committee in accordance with the ATCOP Street Lighting chapter.

5.2.5 Traffic Calming Devices

Devices to slow traffic should be lit with white light in accordance with The Standard and the ATCOP Street Lighting chapter.

5.2.6 Subways

Subways are provided as a safe route for pedestrians and cyclists to cross busy traffic routes or railways. Subways and the approaches to them can be intimidating at night if they are not carefully designed and lit.

Lighting must be designed and installed in accordance with the ATCOP Street Lighting chapter, taking care to ensure the entrance/exits are bright and attractive. The walls should be treated or tiled in a light colour to reflect the installed lighting.

5.2.7 Dark Night

AS 4282:1997 must be used when designing for spill light. Upward waste light should be managed within the limits set by The Standard). The use of night dimming profiles should be used wherever appropriate to limit waste light and provide energy savings.

5.2.8 Night-dimming Profiles

Lighting levels during the hours of darkness should be varied to a standard appropriate for the location and traffic/pedestrian levels in accordance with the ATCOP Street Lighting chapter. It is AT's preference to install either fixed profile dimming or interactive control so lighting levels can be varied during the night to match the traffic conditions. This reduces night glow and is energy efficient.

5.2.9 Private Right-of-ways

All street lights in private right-of-ways should be installed and maintained by private landowners.

5.2.10 Carparks

All public carparks, whether indoor or outdoor, must be illuminated to the appropriate standard for pedestrian safety and security in accordance with the ATCOP Street Lighting chapter and other relevant standards.

5.3 Street Lighting - Rural

Since the ambient light and sky glow in rural areas is less than in urban areas the impact of obtrusive light is more pronounced. Road lighting should be kept to the minimum standard at intersections and road terminations where necessary for safety reasons. Priority should be given to roads that are designated for traffic detours from main roads. The Standard and the ATCOP Street Lighting chapter set out the requirements.

The AT Guideline on the Hauraki Gulf Islands details the specific street lighting requirements for these areas.

5.3.1 Rural Intersections

All rural intersections should remain unlit at night unless accident rates/safety concerns indicate that the installation of a flag light would be beneficial. In these areas, consideration should be given to installing solar powered luminaires where a mains power connection is unavailable or expensive.

6. Monitoring and Review

These guidelines shall be reviewed in 12 months and thereafter as part of the three year review cycle aligned to the Long Term Plan.

7. Related Guidelines

The performance standards and detailed specifications for the provision of lighting in the road corridor are given in the AT Code of Practice.

These guidelines also refer to the AT Local Area Traffic Management Guidelines, AT Vegetation in the Road Reserve Guidelines, AT Street Amenities Guidelines, the AT Signage Guidelines, and the AT Hauraki Gulf Islands Guidelines.

8. Document Status

Owner (contact for updates, clarity etc.)	Siri Rangamuwa (Asset Management Planning Manager)	
Version no:	1.0 (Final)	
Issue date:	October, 2013	
Review date:	October, 2014	
Document ref no:	P-0003	Intranet Ref:

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